

WHAT IS CLAIMED IS:

1. An ultra-light sound insulator, comprising:

a sound absorption layer that is light in weight and has a thickness in a range of 1 to 100 mm, a density in a range of 0.01 to 0.2 g/cm³ or more preferably in a range of 0.03 to 0.08 g/cm³; and

an air-impermeable resonance layer that is bonded to said sound absorption layer via an adhesive layer and has an area-weight of not greater than 600 g/m² or more preferably of not greater than 300 g/m²,

wherein an adhesion strength of said adhesive layer against said sound absorption layer and said air-impermeable resonance layer is set in a range of 1 to 20 N/25 mm or more preferably in a range of 3 to 10 N/25 mm under conditions of a peel angle of 180 degrees and a peel width of 25 mm,

an adhesion area of said adhesive layer is 50 to 100% or more preferably 80 to 100% of a whole interface between said sound absorption layer and said air-impermeable resonance layer, and

said sound absorption layer faces to a vehicle body panel, while said air-impermeable resonance layer faces to a vehicle interior.

2. An ultra-light sound insulator, wherein said sound absorption layer has a multi-layer structure of a high-density sound absorption layer and a low-density sound absorption layer.

3. An ultra-light sound insulator in accordance with claim 2, wherein said high-density sound absorption layer has a density in a range of 0.05 to 0.20 g/cm³ and a thickness in a range of 2 to 70 mm, and

said low-density sound absorption layer has a density in a range of 0.01 to 0.10 g/cm³ and a thickness in a range of 2 to 70 mm.

4. An ultra-light sound insulator in accordance with either one of

claims 2 and 3, wherein said high-density sound absorption layer has an initial compression repulsive force in a range of 30 to 600 N or more preferably in a range of 50 to 300 N,

said low-density sound absorption layer has an initial compression repulsive force in a range of 5 to 300 N or more preferably in a range of 10 to 100N, and

said initial compression repulsive force of said high-density sound absorption layer is at least 1.2 to 40 times said initial compression repulsive force of said low-density sound absorption layer and said high-density sound absorption layer has a thickness occupying 20 to 80% of said thickness of said sound absorption layer, or more preferably said initial repulsive force of said high-density sound absorption layer is at least 1.5 to 5 times said initial compression repulsive force of said low-density sound absorption layer and said high-density sound absorption layer has a thickness occupying 40 to 60% of said thickness of said sound absorption layer.

5. An ultra-light sound insulator in accordance with claim 1, wherein said sound absorption layer has a mono-layer structure and has a density in a range of 0.02 to 0.20 g/cm³ and a thickness in a range of 2 to 70 mm.

6. An ultra-light sound insulator in accordance with claims 5, wherein said sound absorption layer has an initial compression repulsive force in a range of 2 to 200 N or more preferably in a range of 20 to 100 N.

7. An ultra-light sound insulator in accordance with any one of claims 1 through 6, said ultra-light sound insulator further comprising a second sound absorption layer bonded to the other face of said air-impermeable resonance layer, which faces to said vehicle interior,

said second sound absorption layer having a density in a range of 0.01 to 0.2 g/cm³ or more preferably in a range of 0.05 to 0.15 g/cm³ and a

thickness in a range of 1 to 20 mm or more preferably in a range of 4 to 10 mm.

8. An ultra-light sound insulator in accordance with claim 7, wherein said second sound absorption layer has either of a mono-layer structure and a multi-layer structure.

9. An ultra-light sound insulator in accordance with either one of claims 7 and 8, wherein said second sound absorption layer has a multi-layer structure of a lower layer and an upper layer,

said lower layer of said second sound absorption layer being bonded to said air-impermeable resonance layer or otherwise said upper layer and said lower layer of said second sound absorption layer being laid one upon said other by means of a mechanical boring force.

10. An ultra-light sound insulator in accordance with any one of claims 1 through 9, wherein said air-impermeable resonance layer is either of a foam and a film,

said air-impermeable resonance layer having a thickness in a range of 1 to 7 mm or more preferably in a range of 2 to 3 mm in the case of said foam, while having a thickness in a range of 10 to 600 μm or more preferably in a range of 20 to 300 μm in the case of said film.